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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,138	12/30/2003	Heung-Yong Ha	9717.24US01	1780

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EXAMINER	
CHEN, BRET P	
ART UNIT	PAPER NUMBER
1792	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/751,138	HA ET AL.	
	Examiner	Art Unit	
	Bret Chen	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3 and 7-24* is/are pending in the application.

4a) Of the above claim(s) *15,16 and 18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3, 7-14,17,19-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/10/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application.
6) ☐ Other: _____.

DETAILED ACTION

Claims 3, 7-24 are pending in this application. Amended claims 3, 7, 13-14, 17, 19-20; newly added claim 24, and canceled claims 1, 4-5 are noted.

The amendment dated 7/10/09 has been entered and carefully considered. The examiner appreciates the amendments to the claims. In view of said amendment, the previous 112 rejection and the 102 art rejection have been withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 24 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In newly added claim 24, the limitation wherein the inorganic thin film is "non-porous" is deemed new matter as there is not support for such a limitation in the original specification.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In newly added claim 24, the term "non-porous" is deemed vague and indefinite as to what said term means. In general, most inorganic films have some porosity. What is meant by non-porous?

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 19, 3, 8-9, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and Morosanu and further in view of Nomura (5,439,736).

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes (abstract) which coats a polymer electrolyte membranes with a proton-conducting inorganic thin film for fuel cells (col.4 lines 10-29). The inorganic thin film can be silicon oxide (SiO_2), titanium oxide (TiO_2), or/and aluminum oxide (Al_2O_3) (col.4 lines 53-61). However, the reference fails to teach plasma CVD.

Debe teaches of forming a membrane electrode assembly comprising an ion conducting membrane and one or more electrode layers for use in fuel cells (abstract). Specifically, inorganic material such as oxides (col.12 lines 52-67) can be deposited by CVD or sputtering (col.13 lines 45-62). Morosanu teaches that chemical vapor deposition can include plasma CVD

processes. It would have been obvious to utilize a plasma CVD process to deposit the oxide films in Ohzu's process with the expectation of obtaining similar results given the teachings of Debe and Morosanu which teach the conventionality of depositing oxide films by plasma CVD.

In addition, Ohzu/Debe/Morosanu fails to teach a metallorganic compound with oxygen.

Nomura discloses a method of forming a composite membrane using a disiloxane and oxygen in a plasma (abstract). In one embodiment, hexamethyl disiloxane can be used (col.3 lines 13-56). It would have been obvious to one skilled in the art to use a metallorganic compound with oxygen in a plasma in the process of Ohzu/Debe/Morosanu with the expectation of success because Nomura teaches the conventionality of doing same.

Regarding claim 3, Ohzu teaches porous poly tetrafluoroethelyne (PTFE), poly vinylidenefluoride (PVDF), or poly propylene (PP) (col.4 lines 34-41).

Regarding claim 8, Nomura teaches a power of 50-200W (col.7 lines 64-65).

Regarding claim 9, Nomura teaches a pressure of 0.01-2 Torr (col.5 lines 54-56).

Regarding claim 17, Ohzu teaches forming a membrane electrode assembly (col.8 lines 38-49, col.12 lines 24-25 and Figure 2).

Regarding claim 24, Ohzu teaches a thin film material, similar to that of the applicant's. It is the examiner's position that the thin film is non-porous.

Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and Morosanu and further in view of Nomura (5,439,736) and Izu et al. (5,670,224).

Ohzu/Debe/Morosanu/Nomura discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by plasma CVD using a metallorganic compound with oxygen as noted above. However, the references fail to teach an argon plasma pretreatment step.

Izu teaches of forming a modified silicon oxide coating by using microwave CVD (col.1 lines 15-20) in which an argon pretreatment step is utilized with the expressed purpose of enhancing barrier properties (col.7 lines 19-46). It would have been obvious to utilize the argon pretreatment step in the process of Ohzu/Debe/Morosanu/Nomura with the expectation of obtaining the desired film properties including barrier characteristics.

Regarding claims 11-12, these issues have been addressed above.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and Morosanu and further in view of Nomura (5,439,736) and Ozeki (2002/0114958).

Ohzu/Debe/Morosanu/Nomura discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by plasma CVD using a metallorganic compound with oxygen as noted above. However, the reference fails to teach the appropriate thickness.

Ozeki et al. teaches the concept of providing an inorganic thin film coating (0001-0002, 0008-0009, 0072) with a thickness of 500nm or less (0072) on a polymer membrane (0060) in a

fuel cell (0001) in order to in order to provide a uniform coating on the polymer membrane while avoiding the formation of cracks in the coating layer (0072).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the concept of making an inorganic thin film coating with a thickness of 500nm or less of Ozeki et al. to the inorganic thin film coating of Ohzu et al. in order to provide a uniform coating on the polymer membrane while avoiding the formation of cracks in the coating layer.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Debe et al. (5,879,828) and Morosanu and further in view of Nomura (5,439,736) and Zuber et al. (6,156,449).

Ohzu/Debe/Morosanu/Nomura discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by plasma CVD using a metallorganic compound with oxygen as noted above. However, the reference fails to teach a proton-conducting ionomer solution.

Zuber teaches of forming a polymer electrolyte membrane layer by using an ionomer solution (col.3 lines 34-42). It would have been obvious to utilize an ionomer solution in Ohzu with the expectation of success because Zuber teaches the conventionality of using same to form a polymer electrolyte membrane layer.

Claims 7, 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Sproul (5,789,071).

Ohzu discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes (abstract) which coats a polymer electrolyte membranes with a proton-conducting inorganic thin film for fuel cells (col.4 lines 10-29). The inorganic thin film can be silicon oxide (SiO_2), titanium oxide (TiO_2), or/and aluminum oxide (Al_2O_3) (col.4 lines 53-61). However, the reference fails to teach sputtering.

Sproul teaches of forming oxide coatings by sputtering (title) using an aluminum target having a purity of 99.9% at a pressure of 28 mTorr (col.12 lines 37-44). The power can be from 40-280 watts (col.12 lines 59-62). It would have been obvious to utilize sputtering in the process of Ohzu with the expectation of success because Sproul teaches the conventionality of depositing oxide films by sputtering.

Regarding claim 7, Sproul teaches a purity of 99.9% at a pressure of 28 mTorr (col.12 lines 37-44).

Regarding claim 21, Sproul teaches a power of 40-280 watts (col.12 lines 59-62)

Regarding claim 22, Sproul teaches a pressure of 28 mTorr (col.12 lines 37-44).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzu et al. (6,416,898) in view of Sproul (5,789,071) and further in view of Izu et al. (5,670,224).

Ohzu/Sproul discloses a fuel cell in which humidification control for maintaining adequate moisture in electrolyte membranes which coats a polymer electrolyte membranes with

an inorganic thin film such as silicon oxide, titanium oxide, or/and aluminum oxide by sputtering as taken above. However, the references fail to teach an argon plasma pretreatment step.

Izu teaches of forming a modified silicon oxide coating by using microwave CVD (col.1 lines 15-20) in which an argon pretreatment step is utilized with the expressed purpose of enhancing barrier properties (col.7 lines 19-46). It would have been obvious to utilize the argon pretreatment step in the process of Ohzu/Sproul with the expectation of obtaining the desired film properties including barrier characteristics.

Response to Arguments

Applicant's arguments filed 7/10/09 have been fully considered but they are not persuasive.

Applicant argues that Ohzu teaches away from plasma CVD and hence leads away from the claimed invention (p.8 first two full paragraphs).

The examiner disagrees. Ohzu teaches conventional materials in manufacturing a composite membrane while Debe teaches conventional techniques for forming same. One skilled in the art would reasonably expect that the best materials as disclosed in Ohzu could be combined with a good technique to achieve certain benefits with the expectation of obtaining the best characteristics from use of specific materials and techniques. Applicant has not cited any factual evidence to the contrary.

Applicant next argues that Ohzu fails to teach the appropriate pore size and thickness (pp.8-9).

The examiner agrees in part. With respect to the pore size, it is noted that the instant claims as presently written do not recite any pore size and hence, applicant's arguments are not commensurate in scope with the instant claims. In addition, the issue of thickness has been addressed above. It is further noted that the arguments

Applicant next argues that the temperature of the heat treatment is too high (pp.9-10).

The examiner agrees in part. However, it is noted that the claims as presently written do not recite any heat treatment temperature and hence, applicant's arguments are not commensurate in scope with the instant claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bret Chen whose telephone number is (571)272-1417. The examiner can normally be reached on 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bret Chen/
Primary Examiner, Art Unit 1792
11/22/09